

## CONTENTS

v

|   | <u>Page</u> |
|---|-------------|
| Preface .....   | iii         |
| Surface-water stations, in downstream order, for which records are published..... | vii         |
| Ground-water levels .....   | x           |
| Quality of ground-water records .....   | x           |
| Discontinued surface-water discharge or stage-only stations.....                  | xi          |
| Discontinued surface-water-quality stations .....                                 | xv          |
| Introduction .....  | 1           |
| Cooperation .....   | 1           |
| Summary of hydrologic conditions .....  | 1           |
| Precipitation.....  | 1           |
| Surface water .....   | 6           |
| Ground-water levels.....  | 6           |
| Downstream order system and station number.....                                   | 6           |
| Numbering system for wells and miscellaneous sites .....                          | 6           |
| Records of stage and water discharge .....  | 7           |
| Special networks and programs.....  | 7           |
| Explanation of stage and water discharge records .....                            | 8           |
| Data collection and computation .....   | 8           |
| Data presentation .....   | 9           |
| Station manuscript.....   | 9           |
| Peak discharges greater than base discharge .....                                 | 9           |
| Data table of daily-mean values.....  | 9           |
| Statistics of monthly-mean data .....   | 10          |
| Summary statistics .....  | 10          |
| Identifying estimated daily discharge .....                                       | 11          |
| Accuracy of the field data and completed results .....                            | 11          |
| Other records available .....   | 11          |
| Explanation of precipitation records .....  | 11          |
| Data collection and computation .....   | 11          |
| Data presentation .....   | 11          |
| Record of surface-water quality .....   | 12          |
| Classification of records .....   | 12          |
| Explanation of water-quality records .....  | 12          |
| Collection and examination of data .....  | 12          |
| Water analysis.....   | 12          |
| Accuracy of records .....   | 12          |
| Arrangement of records .....  | 12          |
| On-site measurements and sample collection .....                                  | 12          |
| Water temperature.....  | 13          |
| Sediment .....  | 13          |
| Laboratory measurement .....  | 13          |
| Data presentation .....   | 14          |
| Remark codes.....   | 14          |
| Blank samples .....   | 15          |
| Reference samples .....   | 15          |
| Replicate samples .....   | 15          |
| Spike samples .....   | 15          |
| Explanation of ground-water level records .....                                   | 15          |
| Site identification numbers .....   | 15          |
| Data collection and computation .....   | 15          |
| Data presentation .....   | 16          |
| Water-level tables.....   | 16          |
| Hydrographs.....  | 16          |
| Ground-water-quality data .....   | 16          |
| Data collection and computation .....   | 16          |
| Laboratory measurements.....  | 16          |
| Access to USGS data.....  | 16          |
| Records of ground-water quality .....   | 17          |

|   |     |
|---|-----|
| Data collection and computation .....                                       | 17  |
| Data presentation .....   | 17  |
| Definition of terms .....   | 17  |
| Surface-water stations .....  | 27  |
| Discharge at high-flow partial-record stations and miscellaneous sites..... | 311 |
| Discharge at high-flow partial-record stations.....                         | 313 |
| Discharge at miscellaneous sites.....                                       | 321 |
| Analysis of samples collected at miscellaneous sites.....                   | 325 |
| Glacial Ridge ground-water quality.....                                     | 326 |
| Glacial Ridge wetland water quality.....                                    | 350 |
| Grand Portage .....   | 354 |
| Highway 169, Mille Lacs Lake area .....                                     | 359 |
| Amphibian research and monitoring initiative (ARMI) .....                   | 371 |
| Decorah edge water quality .....  | 375 |
| Quality of water at rain garden sites .....                                 | 387 |
| Mercury flux chamber water quality .....                                    | 397 |
| Landscape indicator study for pesticides and nutrients .....                | 399 |
| Mercury cycling in Voyageurs National Park .....                            | 413 |
| Ground water levels by county.....  | 417 |
| Ground-water levels.....  | 419 |
| Index .....   | 421 |

## ILLUSTRATIONS

|   | <u>Page</u> |
|---|-------------|
| Figure 1. Map showing precipitation, in inches, during 2004 water year, Minnesota.....  | 2           |
| 2. Map showing average annual precipitation, in inches, for 30-year period, 1971–2000, in Minnesota.....  | 3           |
| 3. Graphs showing comparison of mean discharge for the 2004 water year with the median of mean discharges for 1971–2000 at seven long-term representative gaging stations ..... | 4           |
| 4. Diagram showing example of system for numbering wells .....  | 7           |
| 5. Map showing location of lake and stream-gaging stations.....   | 28          |
| 6. Map showing location of surface-water quality stations .....   | 29          |
| 7. Map showing location of high-flow partial-record stations.....   | 312         |
| 8. Map showing location of ground-water wells .....   | 418         |







x SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED--Continued

UPPER MISSISSIPPI RIVER MAIN STEM--Continued

Zumbro River:

|  |                   |                |     |
|--|-------------------|----------------|-----|
| South Fork Zumbro River at Rochester ..... | (d - - - -) ..... | 05372995 ..... | 298 |
| Mississippi River at Winona.....           | (d - - - -) ..... | 05378500 ..... | 300 |
| Root River near Pilot Mound .....          | (d - - - -) ..... | 05383950 ..... | 302 |
| Root River near Houston.....               | (d - - - -) ..... | 05385000 ..... | 304 |
| Iowa River:                                |                   |                |     |
| Cedar River near Austin .....              | (d - - - -) ..... | 05457000 ..... | 306 |
| Des Moines River at Jackson .....          | (d - - - -) ..... | 05476000 ..... | 308 |

**GROUND-WATER WELLS, BY COUNTY, FOR WHICH  
RECORDS ARE PUBLISHED IN THIS VOLUME**

**GROUND-WATER LEVELS**

|  | <u>Page</u> |
|--|-------------|
| BELTRAMI   |             |
| Well 473423095053301 Local number 147N35W02CDCBDD..... | 419         |
| MORRISON   |             |
| Well 460444094212501 Local number 130N29W08DCC01 ..... | 420         |